FORUM

Food Animal Production

Combining Traditional Practices and Modern Tools

Americans enjoy the safest, most abundant food supply on Earth. It's also the most affordable. The average American pays a little less than 11 percent of his or her disposable income on food—the lowest rate in the world. In 2002, it took only 39 days to earn enough to pay for food for an entire year. As recently as 1970, it took 51 days.

While housing and health care costs continue to rise, food has actually become more affordable. Why? Because of the efficiency and productivity of American farmers and ranchers. They're constantly fine-tuning their growing and breeding practices and using new technologies to boost their yields.

The Agricultural Research Service (ARS) plays a major role in developing the knowledge base and technologies that allow U.S. producers to meet consumer needs. For example, according to the Economic Research Service, the average American eats about 194 pounds of red meat, poultry, and fish in a year—16 pounds above the level eaten in 1970. Meeting such demands while keeping costs down and maintaining the quality consumers expect is no easy task.

In this regard, ARS has developed a Food Animal Production Action Plan. It supports improvements in reproductive and nutrient intake efficiency as well as product quality. The plan also supports conservation and use of genetic resources, development of genomic tools, and continued study of integrated systems and animal growth and development. With scientists stationed at labs across the United States, we look at questions related to these different areas and use the resulting data in ways that will serve producers and, ultimately, consumers.

Take the problem facing competing cattle producers in the Southeast. Thirty to 40 percent of the nation's beef cattle is produced there, and almost all these animals have some Brahman in their genetic makeup. Brahmans are more resistant to heat and pests than are breed types that evolved in more temperate climates. But they produce tougher steaks, and this can reduce consumers' satisfaction.

The ARS Subtropical Agricultural Research Station in Brooksville, Florida, is trying to overcome the Brahman toughness problem. Scientists are looking for genetic variation within the breed that would allow producers to choose sires based on the beef tenderness of their progeny and other characteristics. They have also started crossbreeding Angus, Brahman, and Romosinuano cattle to develop a line that imparts the benefits of a tropically adapted breed as well as improved carcass quality and reproductive efficiency.

Halfway across the continent, researchers at ARS' Roman L. Hruska U.S. Meat Animal Research Center in Clay Center, Nebraska, are using genetic diversity among sheep breeds to improve production efficiency. They are currently looking into streamlining sheep production systems by developing easy-care, meat-yielding breeds. One possibility they're exploring? Breeds of sheep that don't need to be sheared (see page 7).

The ARS National Animal Germplasm Program, based in Fort Collins, Colorado, is helping to preserve genetic diversity within food-animal populations. The program provides a safe repository for frozen semen or embryos from beef and dairy cattle, poultry, swine, sheep, goats, and aquatic animals. These genetic resources could help researchers solve future food-production problems.

ARS researchers are also using high-tech tools to improve food-animal production efficiency now. For instance, scientists at ARS' Biotechnology and Germplasm Laboratory in Beltsville, Maryland, are using techniques originally developed for human medicine to extend the viability of turkey sperm. The turkey industry relies on artificial insemination to produce nearly 300 million birds annually. Producers must inseminate breeder hens every week for 24 to 26 weeks, but they can store sperm for only 8 to 18 hours before it becomes infertile. Hens, however, can store viable sperm inside their bodies for more than 2 months. ARS researchers are hoping to identify the genes that allow hens to keep sperm alive by taking genetic "snapshots" of sperm-storage tissues from inseminated and noninseminated hens and comparing the two. Eventually, they may be able to use this information to create a method for storing viable sperm for days, weeks, or even months at a time.

Information systems help compile and quantify the massive amounts of production data collected on different animals. ARS researchers are harnessing the power of computer modeling to simulate production systems and uncover the economic value of different traits. As the article on page 12 indicates, modeling studies undertaken at Fort Keogh Livestock and Range Research Laboratory in Miles City, Montana, are helping producers find bulls that will produce the most profitable offspring.

Computers are also helping ARS researchers and others map the bovine, chicken, pig, sheep, and trout genomes, among others. When complete, these genetic road maps will provide additional information that researchers and producers can use to produce leaner, more tender, more fertile animals. Meantime, ARS will continue to combine traditional breeding programs with other tools at our disposal to sustain and increase food-animal productivity to benefit producers and consumers alike.

For more information about the ARS Food Animal Production Action Plan and the many research programs it comprises, visit the ARS National Program web site at www.nps.ars.usda.gov.

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